SEQUENCE LISTING

<110> Mahajan, Pramod B.
      Shi, Jinrui

<120> Maize Rad50 Orthologue and Uses Thereof

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<151> 1999-05-05

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agaagttgat agggagatag catccgcaat ctaggtttgg ggcaatcgct ctggccagac     240
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                                                          Met Ser
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acc gtt gac aag atg ctg atc aag ggg att cgg agc ttc gat ccg gac      345
Thr Val Asp Lys Met Leu Ile Lys Gly Ile Arg Ser Phe Asp Pro Asp
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aat aag aac gtc atc acc ttc ttc aag ccg ctc acc ctc atc gtt ggc      393
Asn Lys Asn Val Ile Thr Phe Phe Lys Pro Leu Thr Leu Ile Val Gly
        20               25               30

ccc aac ggt gct ggc aag acc acg atc atc gag tgc ctg aag ctt tct      441
Pro Asn Gly Ala Gly Lys Thr Thr Ile Ile Glu Cys Leu Lys Leu Ser
 35               40               45               50

tgc acc ggc gag ctg ccc ccc aac tcc cgc tct ggc cac acc ttc gtc      489
Cys Thr Gly Glu Leu Pro Pro Asn Ser Arg Ser Gly His Thr Phe Val
                55               60               65

cac gac ccc aag gta gct ggc gag acg gaa aca aaa gga caa att aag      537
His Asp Pro Lys Val Ala Gly Glu Thr Glu Thr Lys Gly Gln Ile Lys
                70               75               80

ttg cgg ttt aag act gca gca gga aag gat gtg gtg tgc atc cgg tcc      585
Leu Arg Phe Lys Thr Ala Ala Gly Lys Asp Val Val Cys Ile Arg Ser
        85               90               95

ttc cag ctt acc caa aag gca tca aag atg gag ttt aag gca att gaa      633
Phe Gln Leu Thr Gln Lys Ala Ser Lys Met Glu Phe Lys Ala Ile Glu
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                100                         105                         110
agc gtc ctc cag act ata aat cca cac aca ggg gag aaa gtc tgc ctc        681
Ser Val Leu Gln Thr Ile Asn Pro His Thr Gly Glu Lys Val Cys Leu
115                 120                 125                 130

agc tac aga tgt gct gac atg gat aga gag att cct gcc tta atg ggt        729
Ser Tyr Arg Cys Ala Asp Met Asp Arg Glu Ile Pro Ala Leu Met Gly
                    135                 140                 145

gtt tcg aag gcc gta ctg gag aat gtt ata ttt gtt cac caa gat gaa        777
Val Ser Lys Ala Val Leu Glu Asn Val Ile Phe Val His Gln Asp Glu
                150                 155                 160

tcc aat tgg cca ttg cag gac ccg tca aca ctt aag aag aag ttc gat        825
Ser Asn Trp Pro Leu Gln Asp Pro Ser Thr Leu Lys Lys Lys Phe Asp
                165                 170                 175

gac atc ttc tct gcc aca cgc tat acg aaa gct ctt gaa gtc ata aag        873
Asp Ile Phe Ser Ala Thr Arg Tyr Thr Lys Ala Leu Glu Val Ile Lys
            180                 185                 190

aaa ctt cac aag gat caa atg caa gag atc aag act ttt agg tta aag        921
Lys Leu His Lys Asp Gln Met Gln Glu Ile Lys Thr Phe Arg Leu Lys
195                 200                 205                 210

ctg gag aac ctt cag act gta aaa gac caa gca cat aag ctg cgt gaa        969
Leu Glu Asn Leu Gln Thr Val Lys Asp Gln Ala His Lys Leu Arg Glu
                215                 220                 225

aat att gct caa gat caa gaa aag tca gat gcc tca aaa tct cag atg       1017
Asn Ile Ala Gln Asp Gln Glu Lys Ser Asp Ala Ser Lys Ser Gln Met
                230                 235                 240

gag caa ctg aag gaa aag atc tgt ggt acc gag aga gaa atc ctg caa       1065
Glu Gln Leu Lys Glu Lys Ile Cys Gly Thr Glu Arg Glu Ile Leu Gln
                245                 250                 255

atg gaa aca agt ttg gat gaa ctg aga aga ctt cag gga caa att gac       1113
Met Glu Thr Ser Leu Asp Glu Leu Arg Arg Leu Gln Gly Gln Ile Asp
        260                 265                 270

atc aag gca aca gag aga agt aca tta ctt acg cag cag cat gaa aag       1161
Ile Lys Ala Thr Glu Arg Ser Thr Leu Leu Thr Gln Gln His Glu Lys
275                 280                 285                 290

ctt gct gca ctt tct gag gaa aat gaa gat acc gat gag gaa cta atg       1209
Leu Ala Ala Leu Ser Glu Glu Asn Glu Asp Thr Asp Glu Glu Leu Met
                295                 300                 305

gaa tgg caa aca aaa ttt gaa gaa agg att gcg tta cta gaa aca aaa       1257
Glu Trp Gln Thr Lys Phe Glu Glu Arg Ile Ala Leu Leu Glu Thr Lys
            310                 315                 320

atc agt aaa ctt gta aga gat atg gat gat gaa gca tct tat agc tcc       1305
Ile Ser Lys Leu Val Arg Asp Met Asp Asp Glu Ala Ser Tyr Ser Ser
            325                 330                 335

gtt ctg tcc aaa caa aat tct gaa tta aca cat gaa att gga aag ctc       1353
Val Leu Ser Lys Gln Asn Ser Glu Leu Thr His Glu Ile Gly Lys Leu
        340                 345                 350
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cag gca gaa gct gat gct cac ctg act atg aag cat gaa cga gac tca        1401
Gln Ala Glu Ala Asp Ala His Leu Thr Met Lys His Glu Arg Asp Ser
355             360             365             370

gac ata aaa aat ata tgc act aaa cat aat ctt ggg ccg gtt cct gaa        1449
Asp Ile Lys Asn Ile Cys Thr Lys His Asn Leu Gly Pro Val Pro Glu
                375             380             385

cat ccc ttt acg aat gat gtt gct atg aac ctt aca aac agg att aaa        1497
His Pro Phe Thr Asn Asp Val Ala Met Asn Leu Thr Asn Arg Ile Lys
                390             395             400

gcg aga cta tca agt ctt gag aat gat ttg ctg gat aag aag aaa tcc        1545
Ala Arg Leu Ser Ser Leu Glu Asn Asp Leu Leu Asp Lys Lys Lys Ser
            405             410             415

aat gaa gat cag tta gat gtt ttg tgg aaa cac tat ctt aaa ata aat        1593
Asn Glu Asp Gln Leu Asp Val Leu Trp Lys His Tyr Leu Lys Ile Asn
        420             425             430

gct cgc tac tcc gaa gtt gat ggt cag ata caa tct aag att gaa tcc        1641
Ala Arg Tyr Ser Glu Val Asp Gly Gln Ile Gln Ser Lys Ile Glu Ser
435             440             445             450

atg tca ggc att tta aga cgg aga aaa gat aaa gag aaa gaa cgc gat        1689
Met Ser Gly Ile Leu Arg Arg Arg Lys Asp Lys Glu Lys Glu Arg Asp
                455             460             465

gct gca gaa gtg gag ctt tca aaa ttt aat cta tcc cgt atc gat gag        1737
Ala Ala Glu Val Glu Leu Ser Lys Phe Asn Leu Ser Arg Ile Asp Glu
            470             475             480

agg gag aga cat atg caa att gaa gtc gag agg aag aca ctt gcg ctt        1785
Arg Glu Arg His Met Gln Ile Glu Val Glu Arg Lys Thr Leu Ala Leu
            485             490             495

gga gaa aga gac tat gat tca att ata agt cag aaa cga aca gaa gta        1833
Gly Glu Arg Asp Tyr Asp Ser Ile Ile Ser Gln Lys Arg Thr Glu Val
        500             505             510

tat agt ttg gaa cag aaa ata aaa gtg ctt ctg cgg gag aaa gat ata        1881
Tyr Ser Leu Glu Gln Lys Ile Lys Val Leu Leu Arg Glu Lys Asp Ile
515             520             525             530

ata aat aga aat gct gat gaa aga gta aaa ctg ggt ttg aag aag gat        1929
Ile Asn Arg Asn Ala Asp Glu Arg Val Lys Leu Gly Leu Lys Lys Asp
                535             540             545

gca ttg gaa agc agc aag gac aag ctc aat gag ata gtt aat gag cat        1977
Ala Leu Glu Ser Ser Lys Asp Lys Leu Asn Glu Ile Val Asn Glu His
                550             555             560

aag gat aaa atc aaa aag gta ctt agg ggg agg aat cct ttt gag aag        2025
Lys Asp Lys Ile Lys Lys Val Leu Arg Gly Arg Asn Pro Phe Glu Lys
                565             570             575

gat atg aag aag gag atc aat caa gcc ttt tgg cct gtg gac aag gaa        2073
Asp Met Lys Lys Glu Ile Asn Gln Ala Phe Trp Pro Val Asp Lys Glu
        580             585             590

tac aat gag tta aga tca aaa tcc cag gaa gca gag caa gag ctt aaa        2121
Tyr Asn Glu Leu Arg Ser Lys Ser Gln Glu Ala Glu Gln Glu Leu Lys
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      595                    600                    605                    610

      ttt act cag agc aaa gta act gat gct aga gaa caa ttg aca aaa ctt      2169
      Phe Thr Gln Ser Lys Val Thr Asp Ala Arg Glu Gln Leu Thr Lys Leu
                      615                 620                 625

      cga aga gat atg gat gca aaa aga aga ttc ctg gac tcg aaa ctt caa      2217
      Arg Arg Asp Met Asp Ala Lys Arg Arg Phe Leu Asp Ser Lys Leu Gln
                      630                 635                 640

      tct att tta cag ata tct gct aat gtt gac atg ttt ccc aaa gtt cta      2265
      Ser Ile Leu Gln Ile Ser Ala Asn Val Asp Met Phe Pro Lys Val Leu
                      645                 650                 655

      caa gac gcc atg aac aaa aga gat gaa cag aaa aga tta gag aat ttc      2313
      Gln Asp Ala Met Asn Lys Arg Asp Glu Gln Lys Arg Leu Glu Asn Phe
          660                 665                 670

      gca aat gga atg cgg gaa atg ctt gca cct ttt gaa cat ttg gct cgg      2361
      Ala Asn Gly Met Arg Glu Met Leu Ala Pro Phe Glu His Leu Ala Arg
      675                 680                 685                 690

      aag aat cat gta tgc cca tgc tgt gaa cgt gct ttc aca cct gat gag      2409
      Lys Asn His Val Cys Pro Cys Cys Glu Arg Ala Phe Thr Pro Asp Glu
                      695                 700                 705

      gag gat gag ttc gtg aag aaa caa agg atg caa aac tca agt act gca      2457
      Glu Asp Glu Phe Val Lys Lys Gln Arg Met Gln Asn Ser Ser Thr Ala
                      710                 715                 720

      gag aga tct aaa gct ctg gca atg gaa tca tca aat gct gaa gct ctt      2505
      Glu Arg Ser Lys Ala Leu Ala Met Glu Ser Ser Asn Ala Glu Ala Leu
                  725                 730                 735

      ttt cag caa ttg gat aaa ctt cgg act atc tat gat gct tat gtg aag      2553
      Phe Gln Gln Leu Asp Lys Leu Arg Thr Ile Tyr Asp Ala Tyr Val Lys
              740                 745                 750

      ctg gta gaa gaa acc ata cct cta gca gag aaa aac ttg aat caa cat      2601
      Leu Val Glu Glu Thr Ile Pro Leu Ala Glu Lys Asn Leu Asn Gln His
      755                 760                 765                 770

      ttg gcg gat gaa agt cag aag gcg cag gca ttt gat gat ctt ttg ggt      2649
      Leu Ala Asp Glu Ser Gln Lys Ala Gln Ala Phe Asp Asp Leu Leu Gly
                      775                 780                 785

      gtt ctt gcc cat gtt caa atg gac agg gat gca gtg gaa gcc tta tta      2697
      Val Leu Ala His Val Gln Met Asp Arg Asp Ala Val Glu Ala Leu Leu
                      790                 795                 800

      caa ccc act gat act att gac agg cat gta cat gaa att caa cag cta      2745
      Gln Pro Thr Asp Thr Ile Asp Arg His Val His Glu Ile Gln Gln Leu
                      805                 810                 815

      gtc aaa gaa gta gaa gat ctt gaa tat gca ctt gat tct agt ggc cga      2793
      Val Lys Glu Val Glu Asp Leu Glu Tyr Ala Leu Asp Ser Ser Gly Arg
          820                 825                 830

      ggt gtc aag tct ttg gag gaa att caa ctg gag ctg aac ttt ctg cag      2841
      Gly Val Lys Ser Leu Glu Glu Ile Gln Leu Glu Leu Asn Phe Leu Gln
      835                 840                 845                 850
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aga aca agg gac aca ttg att gtc gaa gtg gat gat ctt aga gat caa        2889
Arg Thr Arg Asp Thr Leu Ile Val Glu Val Asp Asp Leu Arg Asp Gln
            855                 860                 865

cat aga atg cta aat gaa gat atg tca agt gct cag gtg aga tgg cac        2937
His Arg Met Leu Asn Glu Asp Met Ser Ser Ala Gln Val Arg Trp His
            870                 875                 880

aat gct cgg gaa gag aaa gtg aaa gct tct agc ata ttg gaa aga ttc        2985
Asn Ala Arg Glu Glu Lys Val Lys Ala Ser Ser Ile Leu Glu Arg Phe
            885                 890                 895

caa aaa tct gaa gag gaa ttg gtg ctt cta gct gag gaa aaa gaa caa        3033
Gln Lys Ser Glu Glu Glu Leu Val Leu Leu Ala Glu Glu Lys Glu Gln
    900                 905                 910

ctg att gta gaa aag aag ctt tta gaa gag tct ctt gat cca ttg tcc        3081
Leu Ile Val Glu Lys Lys Leu Leu Glu Glu Ser Leu Asp Pro Leu Ser
915                 920                 925                 930

aaa gag aaa gag agc ttg ttg caa gag tat aat gct ttg aag caa aag        3129
Lys Glu Lys Glu Ser Leu Leu Gln Glu Tyr Asn Ala Leu Lys Gln Lys
                935                 940                 945

ctg gat gaa gag tat cat cag ctt gca gaa aga aaa agg gag ttc cag        3177
Leu Asp Glu Glu Tyr His Gln Leu Ala Glu Arg Lys Arg Glu Phe Gln
            950                 955                 960

caa gaa ctt gat gct ctt gga aga ctt aat atg aag ata aaa ggg tac        3225
Gln Glu Leu Asp Ala Leu Gly Arg Leu Asn Met Lys Ile Lys Gly Tyr
            965                 970                 975

ttg gat tcc aag aaa aac gaa aag ctt aag gaa ttg cag gga agg cat        3273
Leu Asp Ser Lys Lys Asn Glu Lys Leu Lys Glu Leu Gln Gly Arg His
    980                 985                 990

gtt ctt tgc cat tct cag tta cag agt tgc atg gca aaa cag caa aga        3321
Val Leu Cys His Ser Gln Leu Gln Ser Cys Met Ala Lys Gln Gln Arg
 995                 1000                1005                1010

ata tca gct gag tta aac aag agc aaa gaa cta ctg cag ggc cag ggc        3369
Ile Ser Ala Glu Leu Asn Lys Ser Lys Glu Leu Leu Gln Gly Gln Gly
                1015                1020                1025

cag ttg aaa aga aac att gat gac aat ctc aag tac agg aaa aca aag        3417
Gln Leu Lys Arg Asn Ile Asp Asp Asn Leu Lys Tyr Arg Lys Thr Lys
            1030                1035                1040

gct gat gtg gaa caa ctt act cgt gat ata gaa tca ctt gaa gaa agg        3465
Ala Asp Val Glu Gln Leu Thr Arg Asp Ile Glu Ser Leu Glu Glu Arg
            1045                1050                1055

ctg ctt tca ata ggt agc ttg tct gct ata gaa gct gat ctg aaa cgc        3513
Leu Leu Ser Ile Gly Ser Leu Ser Ala Ile Glu Ala Asp Leu Lys Arg
            1060                1065                1070

cat tct caa gaa aaa gag agg ctt aat tca gaa ttt aac agg tgg caa        3561
His Ser Gln Glu Lys Glu Arg Leu Asn Ser Glu Phe Asn Arg Trp Gln
1075                1080                1085                1090

gga aca ctt tct gtt tat caa agt aat att tca aag cac aaa caa gag        3609
Gly Thr Leu Ser Val Tyr Gln Ser Asn Ile Ser Lys His Lys Gln Glu
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ctt aaa ctg tca cag tac aag gat atc gag aag cga tat act aat caa      3657
Leu Lys Leu Ser Gln Tyr Lys Asp Ile Glu Lys Arg Tyr Thr Asn Gln
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ttt ctc cag ctt aag aca act gaa atg gca aac aag gac ttg gac aga      3705
Phe Leu Gln Leu Lys Thr Thr Glu Met Ala Asn Lys Asp Leu Asp Arg
        1125                    1130                    1135

tat tat act gct tta gac aag gct ctt atg cgg ttc cac agc atg aag      3753
Tyr Tyr Thr Ala Leu Asp Lys Ala Leu Met Arg Phe His Ser Met Lys
        1140                    1145                    1150

atg gag gag ata aat aaa ata atc aag gaa ctg tgg caa cag aca tac      3801
Met Glu Glu Ile Asn Lys Ile Ile Lys Glu Leu Trp Gln Gln Thr Tyr
1155                    1160                    1165                    1170

aga ggc cag gat att gat tac ata agc ata aat tct gat tct gag ggt      3849
Arg Gly Gln Asp Ile Asp Tyr Ile Ser Ile Asn Ser Asp Ser Glu Gly
                1175                    1180                    1185

gct ggc act cga tca tac agc tac cgc gtt gtt atg caa act ggt gat      3897
Ala Gly Thr Arg Ser Tyr Ser Tyr Arg Val Val Met Gln Thr Gly Asp
                1190                    1195                    1200

gct gag ctg gaa atg cga ggg cgc tgc agt gct ggt cag aag gtt ctt      3945
Ala Glu Leu Glu Met Arg Gly Arg Cys Ser Ala Gly Gln Lys Val Leu
                1205                    1210                    1215

gct tct ctt ata atc aga cta gca ctt gcg gaa act ttc tgc ctg aac      3993
Ala Ser Leu Ile Ile Arg Leu Ala Leu Ala Glu Thr Phe Cys Leu Asn
        1220                    1225                    1230

tgc ggt ata ttg gct ttg gat gag cca act acg aat cta gat ggg cca      4041
Cys Gly Ile Leu Ala Leu Asp Glu Pro Thr Thr Asn Leu Asp Gly Pro
1235                    1240                    1245                    1250

aat gca gag agt ctt gct gct gcg ctg ttg aga ata atg gaa gcc agg      4089
Asn Ala Glu Ser Leu Ala Ala Ala Leu Leu Arg Ile Met Glu Ala Arg
                1255                    1260                    1265

aaa ggg cag gag aac ttc cag ttg att gta atc act cat gat gag aga      4137
Lys Gly Gln Glu Asn Phe Gln Leu Ile Val Ile Thr His Asp Glu Arg
                1270                    1275                    1280

ttt gcc cat ctt atc ggt caa agg cag ctt gct gag aag tac tat cga      4185
Phe Ala His Leu Ile Gly Gln Arg Gln Leu Ala Glu Lys Tyr Tyr Arg
        1285                    1290                    1295

gtc tcc aag gat gag aac cag cac agc ata att gaa tcc caa gag ata      4233
Val Ser Lys Asp Glu Asn Gln His Ser Ile Ile Glu Ser Gln Glu Ile
        1300                    1305                    1310

ttt gac taagggtgtt ctaggaggct gtagcacgca ctcgtttgct agtcgaatcc      4289
Phe Asp
1315

agttaattta tgccaagtac tggtgccaga gcaatgttaa caagctttag gaggctctgt      4349
tacgccgtta cgtcagttgc gtgaaaccta tccttcgttg ttgtatactt atttaatctg      4409
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Val Gly Pro Asn Gly Ala Gly Lys Thr Thr Ile Ile Glu Cys Leu Lys
        35                  40                  45
Leu Ser Cys Thr Gly Glu Leu Pro Pro Asn Ser Arg Ser Gly His Thr
    50                  55                  60
Phe Val His Asp Pro Lys Val Ala Gly Glu Thr Glu Thr Lys Gly Gln
65                  70                  75                  80
Ile Lys Leu Arg Phe Lys Thr Ala Ala Gly Lys Asp Val Val Cys Ile
                85                  90                  95
Arg Ser Phe Gln Leu Thr Gln Lys Ala Ser Lys Met Glu Phe Lys Ala
            100                 105                 110
Ile Glu Ser Val Leu Gln Thr Ile Asn Pro His Thr Gly Glu Lys Val
        115                 120                 125
Cys Leu Ser Tyr Arg Cys Ala Asp Met Asp Arg Glu Ile Pro Ala Leu
    130                 135                 140
Met Gly Val Ser Lys Ala Val Leu Glu Asn Val Ile Phe Val His Gln
145                 150                 155                 160
Asp Glu Ser Asn Trp Pro Leu Gln Asp Pro Ser Thr Leu Lys Lys Lys
                165                 170                 175
Phe Asp Asp Ile Phe Ser Ala Thr Arg Tyr Thr Lys Ala Leu Glu Val
                180                 185                 190
Ile Lys Lys Leu His Lys Asp Gln Met Gln Glu Ile Lys Thr Phe Arg
            195                 200                 205
Leu Lys Leu Glu Asn Leu Gln Thr Val Lys Asp Gln Ala His Lys Leu
    210                 215                 220
Arg Glu Asn Ile Ala Gln Asp Gln Glu Lys Ser Asp Ala Ser Lys Ser
225                 230                 235                 240
Gln Met Glu Gln Leu Lys Glu Lys Ile Cys Gly Thr Glu Arg Glu Ile
                245                 250                 255
Leu Gln Met Glu Thr Ser Leu Asp Glu Leu Arg Arg Leu Gln Gly Gln
            260                 265                 270
Ile Asp Ile Lys Ala Thr Glu Arg Ser Thr Leu Leu Thr Gln Gln His
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Glu Lys Leu Ala Ala Leu Ser Glu Glu Asn Glu Asp Thr Asp Glu Glu
        290                 295                 300
Leu Met Glu Trp Gln Thr Lys Phe Glu Glu Arg Ile Ala Leu Leu Glu
305                 310                 315                 320
Thr Lys Ile Ser Lys Leu Val Arg Asp Met Asp Asp Glu Ala Ser Tyr
                325                 330                 335
Ser Ser Val Leu Ser Lys Gln Asn Ser Glu Leu Thr His Glu Ile Gly
            340                 345                 350
Lys Leu Gln Ala Glu Ala Asp Ala His Leu Thr Met Lys His Glu Arg
        355                 360                 365
Asp Ser Asp Ile Lys Asn Ile Cys Thr Lys His Asn Leu Gly Pro Val
    370                 375                 380
Pro Glu His Pro Phe Thr Asn Asp Val Ala Met Asn Leu Thr Asn Arg
385                 390                 395                 400
Ile Lys Ala Arg Leu Ser Ser Leu Glu Asn Asp Leu Leu Asp Lys Lys
            405                 410                 415
Lys Ser Asn Glu Asp Gln Leu Asp Val Leu Trp Lys His Tyr Leu Lys
            420                 425                 430
Ile Asn Ala Arg Tyr Ser Glu Val Asp Gly Gln Ile Gln Ser Lys Ile
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                435                      440                      445
Glu Ser Met Ser Gly Ile Leu Arg Arg Arg Lys Asp Lys Glu Lys Glu
        450                      455                      460
Arg Asp Ala Ala Glu Val Glu Leu Ser Lys Phe Asn Leu Ser Arg Ile
465                      470                       475                      480
Asp Glu Arg Glu Arg His Met Gln Ile Glu Val Glu Arg Lys Thr Leu
                485                      490                      495
Ala Leu Gly Glu Arg Asp Tyr Asp Ser Ile Ile Ser Gln Lys Arg Thr
                500                      505                      510
Glu Val Tyr Ser Leu Glu Gln Lys Ile Lys Val Leu Leu Arg Glu Lys
                515                      520                      525
Asp Ile Ile Asn Arg Asn Ala Asp Glu Arg Val Lys Leu Gly Leu Lys
        530                      535                      540
Lys Asp Ala Leu Glu Ser Ser Lys Asp Lys Leu Asn Glu Ile Val Asn
545                      550                       555                      560
Glu His Lys Asp Lys Ile Lys Lys Val Leu Arg Gly Arg Asn Pro Phe
                565                      570                      575
Glu Lys Asp Met Lys Lys Glu Ile Asn Gln Ala Phe Trp Pro Val Asp
                580                      585                      590
Lys Glu Tyr Asn Glu Leu Arg Ser Lys Ser Gln Glu Ala Glu Gln Glu
                595                      600                      605
Leu Lys Phe Thr Gln Ser Lys Val Thr Asp Ala Arg Glu Gln Leu Thr
        610                      615                      620
Lys Leu Arg Arg Asp Met Asp Ala Lys Arg Arg Phe Leu Asp Ser Lys
625                      630                       635                      640
Leu Gln Ser Ile Leu Gln Ile Ser Ala Asn Val Asp Met Phe Pro Lys
                645                      650                      655
Val Leu Gln Asp Ala Met Asn Lys Arg Asp Glu Gln Lys Arg Leu Glu
                660                      665                      670
Asn Phe Ala Asn Gly Met Arg Glu Met Leu Ala Pro Phe Glu His Leu
        675                      680                      685
Ala Arg Lys Asn His Val Cys Pro Cys Cys Glu Arg Ala Phe Thr Pro
        690                      695                      700
Asp Glu Glu Asp Glu Phe Val Lys Lys Gln Arg Met Gln Asn Ser Ser
705                      710                       715                      720
Thr Ala Glu Arg Ser Lys Ala Leu Ala Met Glu Ser Ser Asn Ala Glu
                725                      730                      735
Ala Leu Phe Gln Gln Leu Asp Lys Leu Arg Thr Ile Tyr Asp Ala Tyr
                740                      745                      750
Val Lys Leu Val Glu Glu Thr Ile Pro Leu Ala Glu Lys Asn Leu Asn
                755                      760                      765
Gln His Leu Ala Asp Glu Ser Gln Lys Ala Gln Ala Phe Asp Asp Leu
        770                      775                      780
Leu Gly Val Leu Ala His Val Gln Met Asp Arg Asp Ala Val Glu Ala
785                      790                       795                      800
Leu Leu Gln Pro Thr Asp Thr Ile Asp Arg His Val His Glu Ile Gln
                805                      810                      815
Gln Leu Val Lys Glu Val Glu Asp Leu Glu Tyr Ala Leu Asp Ser Ser
        820                      825                      830
Gly Arg Gly Val Lys Ser Leu Glu Glu Ile Gln Leu Glu Leu Asn Phe
        835                      840                      845
Leu Gln Arg Thr Arg Asp Thr Leu Ile Val Glu Val Asp Asp Leu Arg
        850                      855                      860
Asp Gln His Arg Met Leu Asn Glu Asp Met Ser Ser Ala Gln Val Arg
865                      870                       875                      880
Trp His Asn Ala Arg Glu Glu Lys Val Lys Ala Ser Ser Ile Leu Glu
                885                      890                      895
Arg Phe Gln Lys Ser Glu Glu Glu Leu Val Leu Leu Ala Glu Glu Lys
                900                      905                      910
Glu Gln Leu Ile Val Glu Lys Lys Leu Leu Glu Glu Ser Leu Asp Pro
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Leu Ser Lys Glu Lys Glu Ser Leu Leu Gln Glu Tyr Asn Ala Leu Lys
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        930                      935                      940
Gln Lys Leu Asp Glu Glu Tyr His Gln Leu Ala Glu Arg Lys Arg Glu
945                      950                      955                      960
Phe Gln Gln Glu Leu Asp Ala Leu Gly Arg Leu Asn Met Lys Ile Lys
            965                      970                      975
Gly Tyr Leu Asp Ser Lys Lys Asn Glu Lys Leu Lys Glu Leu Gln Gly
            980                      985                      990
Arg His Val Leu Cys His Ser Gln Leu Gln Ser Cys Met Ala Lys Gln
            995                     1000                     1005
Gln Arg Ile Ser Ala Glu Leu Asn Lys Ser Lys Glu Leu Leu Gln Gly
    1010                     1015                     1020
Gln Gly Gln Leu Lys Arg Asn Ile Asp Asp Asn Leu Lys Tyr Arg Lys
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Thr Lys Ala Asp Val Glu Gln Leu Thr Arg Asp Ile Glu Ser Leu Glu
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Glu Arg Leu Leu Ser Ile Gly Ser Leu Ser Ala Ile Glu Ala Asp Leu
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Lys Arg His Ser Gln Glu Lys Glu Arg Leu Asn Ser Glu Phe Asn Arg
            1075                     1080                     1085
Trp Gln Gly Thr Leu Ser Val Tyr Gln Ser Asn Ile Ser Lys His Lys
            1090                     1095                     1100
Gln Glu Leu Lys Leu Ser Gln Tyr Lys Asp Ile Glu Lys Arg Tyr Thr
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Asn Gln Phe Leu Gln Leu Lys Thr Thr Glu Met Ala Asn Lys Asp Leu
            1125                     1130                     1135
Asp Arg Tyr Tyr Thr Ala Leu Asp Lys Ala Leu Met Arg Phe His Ser
            1140                     1145                     1150
Met Lys Met Glu Glu Ile Asn Lys Ile Ile Lys Glu Leu Trp Gln Gln
            1155                     1160                     1165
Thr Tyr Arg Gly Gln Asp Ile Asp Tyr Ile Ser Ile Asn Ser Asp Ser
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Glu Gly Ala Gly Thr Arg Ser Tyr Ser Tyr Arg Val Val Met Gln Thr
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Gly Asp Ala Glu Leu Glu Met Arg Gly Arg Cys Ser Ala Gly Gln Lys
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Val Leu Ala Ser Leu Ile Ile Arg Leu Ala Leu Ala Glu Thr Phe Cys
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Leu Asn Cys Gly Ile Leu Ala Leu Asp Glu Pro Thr Thr Asn Leu Asp
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Gly Pro Asn Ala Glu Ser Leu Ala Ala Ala Leu Leu Arg Ile Met Glu
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Ala Arg Lys Gly Gln Glu Asn Phe Gln Leu Ile Val Ile Thr His Asp
1265                     1270                     1275                     1280
Glu Arg Phe Ala His Leu Ile Gly Gln Arg Gln Leu Ala Glu Lys Tyr
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Glu Ile Phe Asp
            1315
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<223> Designed oligonucleotide based upon an adaptor
      used for cDNA library construction and poly(dT) to
      remove clones which have a poly(A) tail but no
      cDNA insert.
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